Ausfälle hatten. In den nördlichen Pflanzungen erlitten die südlichen Absaaten die meisten Winterschäden, fruchteten am wenigsten und wuchsen am langsamsten. Auf den südlichen Anbauflächen zeigten die südlichen Absaaten die längsten Nadeln und waren sehr raschwüchsig. Die Korrelationen zwischen Wuchsmerkmalen und Klima-Variablen waren zwar in manchen Beispielen statistisch signifikant, erklärten aber im allgemeinen nur 35—50% der Gesamtvarianz. Für die Praxis werden nur 3 Saatgut-Proben zur Pflanzenanzucht empfohlen, deren Wachstum auf mehreren Flächen gut gewesen war.

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Rooting Cuttings from Physiologically Mature Black Cherry

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Introduction

Rooting juvenile black cherry (Prunus serotina EHRHART) via mist propagation is a relatively simple procedure (FARMER and HALL, 1969), but cuttings taken directly from older trees generally exhibit low rootability. In breeding programs, however, it is frequently necessary to clone selected mature trees for retention as parent stock. To date, grafting has been used successfully, but is relatively expensive and presents the breeder with the problems of stock-scion relationships. We have, therefore, used a combination of "rejuvenated" material and high concentration of indolebutyric acid (IBA) to root cuttings of selected genotypes.

Methods

Scions from eight clones in the Tennessee Valley Authority's breeding collection were grafted to seedling stock and lined out in a nursery near Norris, Tennessee. All clones were random selections with respect to knowledge of rooting potential. Ortets of two clones were from western Pennsylvania, two were from western Virginia, and the remaining four were selected in middle and eastern Tennessee. After several years' growth, when the plants were 2 to 3 m. tall, they were pruned heavily in early spring, and shoots originating from subapical buds were used in preliminary propagation trials. In these trials, IBA-talc mixes (.8 to 1.6%) proved moderately effective to ineffective depending upon clone. In February 1973, three to seven ramets from each of six clones and one ramet from two clones were again pruned heavily. In addition, all visible buds were removed from the branches of approximately one half of the pruned ramets. This was done to induce development of shoots from suppressed or adventitious buds which might exhibit greater juvenile rooting capability than shoots from visible buds (SHREVE and MILES, 1972). Fifteen-centimeter-long greenwood cuttings were taken in mid-May. Leaves were pruned to about two-thirds of original length, and cuttings were placed in water for immediate transportation to greenhouse. Entire cuttings were subsequently immersed in an aqueous slurry of 0.1% benomyl (FIORINO *et* al., 1969) for five minutes before receiving one of the following four rooting treatments:

1. 1.6% IBA and 10% benomyl in talc
2. 1% IBA, 1% 1-phenyl-3 methyl-5 pyrazolone (PPZ), 10% powdered sucrose, 10% Captan, 1% N-dimethylaminosuccinamic acid (B-9) in talc (HARE, 1974)
3. 1.5% IBA in 95% ethyl alcohol
4. 1.5% IBA, 0.1% catechol, 0.1% thiamine in 95% alcohol

The basal 2 cm. of cuttings assigned to Treatments 1 and 2 were dipped in the rooting mix. A five-second quick-dip was used for Treatments 3 and 4. After treatment, cuttings were planted in flats filled with a peat : perlite (1 : 1) mix and placed in a greenhouse mist bed supplying six seconds of mist every three minutes during daylight hours. One six-cutting replicate (individual flat) from each of a clone's ramets was assigned to each of the four rooting treatments. Thirty-one flats of each treatment were randomly located within the mist bed. Rooting was evaluated after a four-week propagation period.

Results

Treatment 3 produced significantly (.05 level) higher rooting than the other three treatments (Table 1). Cuttings in Treatment 1 had significantly lower rooting percent than those in Treatments 2, 3, and 4. Rooting percents for Treatment 1 were similar to those observed in previous work with rejuvenated material from these clones.

Clonal variation in rooting was statistically significant and followed a pattern which had been previously noted in this group of clones: Clones 2103 and 2108 from Pennsylvania have consistently exhibited poor rooting, while Clones 2109 and 2172 from middle Tennessee are relatively easy to propagate. The clone X treatment interaction, which resulted from variation in the degree of response to treatment, was also significant.

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Table 1.—Rooting Characteristics of Cuttings from Eight Black Cherry Clones As Influenced by Four Rooting Treatments

Clone Number	Number Replicates	Rooting Percent				No. Roots/Cutting				Length of Longest Root, mm				Survival Percent of Rooted Cuttings
		1	2	3	4	1	2	3	4	1	2	3	4	
2103	7	0	29	33	20	-	4	2	4	-	22	12	9	44
2108	5	5	22	33	35	1	2	4	3	-	11	14	18	80
2109	1	50	100	100	100	2	18	18	7	42	8	23	39	100
2143	3	75	78	83	83	4	21	13	14	22	23	30	21	90
2161	4	0	35	75	25	-	18	20	3	-	15	30	25	22
2162	7	49	32	86	66	4	9	16	8	67	19	37	31	82
2172	1	83	83	100	100	8	19	19	16	52	30	43	41	97
2199	3	22	94	67	47	2	15	7	9	56	21	33	31	80
Mean		35	59	72	59	3	13	12	8	48	19	28	27	74

Removal of visible buds from cutting stock did not affect the rooting capacity of resulting shoots; cuttings from debudded stock had an average rooting percent of 60, while 58 percent of those originating from visible lateral buds rooted.

Number of roots per rooted cutting was affected by treatment and clone in roughly the same fashion as rooting percent. In Treatment 3, correlations between mean clone rooting percent and number and length of roots had coefficients of .89 and .78, respectively. The greatest root lengths, however, were found in Treatment 1, which was also characterized by low root numbers.

Rooted cuttings from the above test and other trials were potted in either peat and perlite or a potting mix (2 loam, 1 peat, 1 sand), periodically watered with soluble fertilizer, and sprayed with gibberellic acid (200 ppm) to induce renewal of shoot elongation. After several months of growth in the greenhouse, average survival was 74 percent, a figure close to that reported by Farmer and Hall (1969) for similarly treated juvenile cuttings. Mean survival percents presented for individual clones in *Table 1* are based on from 34 to 129 cuttings per clone. Though the several easily rooted clones (2109, 2143, 2172) all had high survival percents, the correlation of survival and rooting percent was low and non-significant in this small population of clones. Clone 2161, for example, had 75 percent rooting and large numbers of roots in Treatment 3, but exhibited a survival of only 22 percent.

Discussion and Conclusions

Production of rootable material from physiologically mature black cherry trees by grafting and heavy pruning has been successful. Our observations show no propagation advantage in removing visible buds to obtain shoots from suppressed or adventitious buds. While several years elapse between selection of breeding stock and cutting production using this technique, once "cutting trees" or hedges are available, large numbers of plants can be easily produced. Early pruning designed specifically to promote branching may be helpful in producing abundant material. Our experience suggests that at least two crops of cuttings can be obtained before mid-summer. Once a supply of rooted cuttings is obtained, potted stock can be forced under greenhouse conditions to extend the propagation season from February through June.

In previous work (Farmer and Hall, 1969), a five-second dip treatment of 0.2% IBA in 50% ethyl alcohol was ineffective relative to an IBA-talc mix. The successful quick-dip rooting treatment used in this study (1.5% IBA in 95% ethyl alcohol) is considerably higher in concentration than solutions commonly recommended for difficult plants. The good rooting response and lack of damage to cuttings suggests that this concentration may be suitable for other difficult material, but we have not used the treatment with material taken directly from mature black cherry. Addition of possible rooting co-factors (catechol and thiamine) at relatively high concentrations reduced rooting relative to IBA alone, and cannot be recommended. However, use of synthetic co-factors with auxin has not been thoroughly tested with difficult material and should not be discarded as an investigative approach on the basis of these results.

While the special rooting mix of Hare's (Treatment 2) was more effective than IBA and benomyl in talc, it produced lower rooting percentages than those reported by Hare (1974) for juvenile slash pine treated with the mix, and stimulated less rooting in black cherry than the 1.5% IBA quick-dip. The additional 25 percent rooting accounted for by the difference in the two mixes is large enough, however, to warrant separation of the effects of the various mix components in further factorial tests.

Summary

Softwood stem cuttings of black cherry taken from heavily pruned scions of mature trees were successfully rooted under intermittent mist after a quick-dip treatment with 1.5 percent indolebutyric acid in 95 percent ethyl alcohol.

Key words: Indolebutyric acid, rejuvenation, natural variation.

Zusammenfassung

Grünstecklinge von *Prunus serotina*, die von stark beschnittenen Reisern reifer Bäume stammten, wurden erfolgreich bewurzelt, wenn sie Sprühnebel nach einer Kurztauchbehandlung mit 1,5% Indolbuttersäure in 95%igem Äthylalkohol ausgesetzt worden waren.

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